

were had at Naples as the depth of the sea at this point is not inconsiderable.

Three of the most prevalent forms found in the Mediterranean sea bottom showed a vertical range exceeding 3,500<sup>ft</sup>, for they had not disappeared from cultures made from mud taken at this depth, and it is probable that their bathymetrical range was even considerably greater than this.

Concerning the relation between the superficial strata and extreme abysmal depths, we know nothing. If the relation between the higher forms of animal life hold in reference to bacterial forms, the presumption would be that there is a marked difference as to species between these layers. But such an analogy is inadmissible unless based upon observations, and these as yet are lacking.

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(To be concluded.)

### Plants hurt by a late freeze.

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In observing the effects of a frost in late spring many strange freaks are noticed. On the night of March 4, 1893, the thermometer went down to 29° F. at Lake City, Florida. The opinions as to whether harm was done were as various as the locations heard from. Closer observations showed that the following plants had suffered:

The variety of *Brassica oleracea*, known as "collards," is extensively grown for the kitchen and market. With considerable surprise I found that the young plants which had been set out had their larger leaves frozen. Further search showed the older plants that had shot up to flower drooping over. These racemes did not recover.

The largest and most beautiful of our wild violets, *V. sagittata* Ait., had the expanded portion of the petals, and in some cases the stigma frozen. Where, however, there was a slight protection, as a clump of saw palmetto or a blue berry bush, no harm was done.

Of the ornamental trees, the China tree, *Melia Azederach* L., suffered the most severely. It had made a vigorous growth; some young shoots were five or six inches long. All that were on low limbs less than eight feet from the ground were cut back to last year's wood, while those that were twelve feet or more from the ground were left unharmed.

Of the genus *Citrus* both *C. aurantium* L. and *C. vulgaris*



suffered and with scarcely any perceptible difference. If there was any, the favor was with the former, the sweet orange. The damage was confined to small trees not in bearing. The flower buds, not having opened on bearing trees, were unhurt.

The "zonale" geraniums exposed had leaves cut to the main stem.

On small trees of the prickly ash, *Xanthoxylum Carolinianum* Lam., the young growth of three inches was cut back to the wood; but when the tree was twenty feet or more tall the new growth was not hurt except on very low branches.

In the case of the common English peas there was quite a freak; the pods of a certain size were killed, while none of the rest of the plant sustained any injury.

Some of the earlier varieties of the peach had set young fruit; this was frozen, while the leaves remained entirely unhurt. All the fruit that had set and the open blossoms as well as those nearly open were killed.

The Kelsey plum in some cases had formed fruit which was frozen, while those trees that had not blossomed were left unharmed.

On *Prunus umbellata* Ell. the young leaves, and a very few of the flowers, showed signs of frost, but the leaves revived and some time later showed scarcely any signs of injury.

On the Le Conte pear none of the leaves were entirely frozen but many were frozen half way to the midrib. The blooms were not hurt excepting those that had receptive stigmas. As these trees are very liberal setters, I believe the most liberal, the damage to their crop was not perceptible.

The common old field blackberry, *Rubus cuneifolius* Pursh., had taken advantage of the three weeks of spring time and sent out young growth to the length of five inches; this was cut back to the old hard wood. Only a few flowers had opened and these were unhurt, as were also the flower buds and peduncles.

The crape myrtle, *Lagerstræmia Indica*, had its young shoots cut back to last year's wood.

The large birds nest thistle, *Cirsium horridulum* Michx., that grows all winter in the open field, could not stand this sudden fall in temperature; the upper and projecting leaves all hung down but the vital portion and the lower leaves were not hurt in the least.



*Vaccinium nitidum* Pursh had the open corolla, the exserted stigmas and the old leaves frozen; the young leaves, unopened corollas and small fruit were not hurt.

*Vaccinium tenellum* Ait. had the expanded corolla, exserted stigmas, young leaves and newly formed stems frozen. The young stems were two or three inches long. This species is evergreen with us.

It is curious that the old leaves on *V. nitidum* were frozen while on *V. tenellum* the young leaves suffered.

*Pinguicula lutea* Walt. on the moist pine barrens had the scapes frozen down to the surrounding débris. The scape was frozen to within four inches of the ground and the rest left unhurt.

Young tobacco plants where not protected were killed, but the beds in hammocks or on the edges of hammocks escaped.

Poke weed, *Phytolacca decandra* L., had grown to be a foot or more high, and was cut back to within four inches of the ground. Specimens that were somewhat protected wilted in the sun but recovered in a day or two.

Young beets that were about six inches high had the outer and higher leaves frozen.

Mulberry trees, *Morus alba* L., had grown enough to make a fine shade. The frost killed the younger leaves entirely and the older leaves were more or less hurt, so that it was difficult to find a perfect leaf within ten feet of the ground.

The figs, *F. carica* L., had to make a new start. They had made vigorous growth and the young figs were about the size of a large hazelnut.

*Tradescantia zebrina* was entirely frozen.

*Paspalum læve* had some leaves seven inches long. The outer and more exposed leaves alone sustained injury.

The above notes cover quite completely the plants that sustained injury from that frost.

*Conclusion.*—Most plants are very sensitive to frost during the period of rapid growth.

Portions of plants that have passed through colder weather may be injured by less frost under different conditions (e. g.

*Vaccinium nitidum*, *Cirsium horridulum*). Of the twenty-five species more or less hurt by the frost, three are annuals,

three biennials, and nineteen are perennials; eleven are herbs,

five are shrubs, and nine are classed as trees. Of the fourteen shrubs and trees four are evergreen and ten deciduous.

Lake City, Fla.